

HARBOR MAINTENANCE and IMPROVEMENT PLAN

**TOWN OF SUAMICO
Brown County, Wisconsin**

FEBRUARY 1987



BAY-LAKE Regional Planning Commission
serving communities within the counties of:

FLORENCE • MARINETTE • OCONTO • BROWN • DOOR • KEWAUNEE • MANITOWOC • SHEBOYGAN

HARBOR MAINTENANCE

AND

IMPROVEMENT PLAN

TOWN OF SUAMICO, BROWN COUNTY, WISCONSIN

February 1987

Bay-Lake Regional Planning Commission
Suite 450, Wood Hall, U.W.G.B.
Green Bay, Wisconsin

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TABLE OF CONTENTS

	<u>Page</u>
Section 1 - <u>INTRODUCTION</u>	1
Introduction	3
Section 2 - <u>INVENTORY AND ANALYSIS</u>	5
<u>Physical Setting</u>	
. Location	7
. Political Jurisdiction	7
<u>Topography and Geology</u>	7
<u>Soils</u>	
. Soil Conditions - Brown County	9
. Soil Conditions - Town of Suamico	14
<u>Water Resources</u>	
. Suamico River	15
. Water Related Recreational Uses	15
. Water Resources, Wildlife and Vegetation	17
<u>Climate</u>	20
<u>Land Use</u>	
. Generalized Land Use Conditions - Town of Suamico.	21
. Generalized Land Use Conditions - Suamico Harbor Area	21
<u>Transportation</u>	26
<u>Population</u>	27
<u>Archeological and Historic Sites</u>	30
<u>Economic Characteristics</u>	
. Introduction	30
. Location of Growth Centers	30
. Water Related Industrial and Commercial Uses in the Harbor Area	30
. Proposed Economic Activities	30
Section 3 - <u>EXISTING DREDGING INFORMATION</u>	33
. Past Dredging Efforts	35
. Sediment Data	35
. Guidance Criteria for In-Water Disposal	45

	<u>Page</u>
Section 4 - <u>PROPOSED DREDGE MATERIAL DISPOSAL SITING</u> .	47
. Methodology	49
. Physical Limitations Affecting Dredge Disposal Siting	49
. Dredge Disposal Options	50
. Recommended Dredge Disposal Alternatives - Town of Suamico	52
. Reuse and Disposal Options	52
. Summary - Future Considerations	55
. Deficiencies in Sediment Test Data	55
. Costs	55
. Potential Funding Sources	55
. Community Involvement	56
 <u>APPENDICES</u>	57
Appendix A - State Regulations Affecting Dredging.	59
 <u>BIBLIOGRAPHY</u>	61

LIST OF MAPS

	<u>Page</u>
Map 1 Locational Map	8
Map 2 Soil Associations, Brown County	10
Map 3 Public and Private Recreational Boating Facilities and Public Parks	16
Map 4 Nesting Areas	18
Map 5 Important Fishery Areas	19
Map 6 Generalized Land Use-1980, Town of Suamico .	24
Map 7 Land Use, Suamico Harbor	25
Map 8 Growth Centers in the Bay-Lake Region . . .	31
Map 9 Sediment Test Sites, Suamico Harbor	36
Map 10 Areas Suitable for Dredge Material Disposal.	54

LIST OF TABLES

Table 1 Public and Private Recreation Boating Facilities, Suamico Harbor	15
Table 2 Brown County Land Use - 1980 (Acreage) . . .	22
Table 3 Brown County Land Use - 1980 (Percentage) .	23
Table 4 Summary Population of Minor Civil Divisions, Brown County	28
Table 5 Population Projections of Minor Civil Divisions, Brown County	29
Table 6 U.S. Corps of Engineers Sediment Data . . .	37
Table 7 U.S. Corps of Engineers Sediment Data . . .	38
Table 8 U.S. Corps of Engineers Sediment Data . . .	39
Table 9 U.S. Corps of Engineers Sediment Data . . .	40
Table 10 U.S. Corps of Engineers Sediment Data . . .	41
Table 11 U.S. Corps of Engineers Sediment Data . . .	42
Table 12 U.S. Corps of Engineers Sediment Data . . .	43
Table 13 U.S. Corps of Engineers Sediment Data . . .	44

SECTION 1
INTRODUCTION

HARBOR MAINTENANCE & IMPROVEMENT PLAN

Introduction

An important part of the BLRPC's Coastal Management Work in 1986 is the preparation of Harbor Maintenance and Improvement Plans for two harbors in the Commission's 8 county region. The two harbors to be analyzed as part of this work element are the Town of Suamico and Pensaukee Harbors.

The purpose of this plan is to assist the Town of Suamico and its officials in making maintenance dredging decisions that are of benefit to both the community and the environment. Because of the continuing sediment placement that is occurring in and around the Suamico Harbor due to the natural flow of the Suamico River, and the littoral drift that occurs in Green Bay, the problem of dredging becomes a reoccurring problem. Not only is dredging a costly process but it is also compounded with the issue that if dredging is to occur suitable locations for the disposal of the dredge material must be identified and approved.

To address this issue, the Wisconsin Coastal Management Program (WCMP) requested that the Bay-Lake Regional Planning Commission undertake a study of the Suamico Harbor, leading to the preparation of a 10 year unpolluted dredge materials disposal plan which will satisfy the requirements set forth in revised NR 347 and proposed harbor dredging legislation which relate to harbor maintenance dredging. The harbor maintenance legislation promotes a planning process that considers long-term maintenance and improvement needs of Great lakes navigation channels. In particular, this planning process should: identify all reasonable means of using or disposing of unpolluted sediment on land or in water; evaluate available options for reducing the volume of sediment in tributary streams; and identify alternatives which provide for the beneficial use of unpolluted sediment that does not create adverse impacts on the environment and is technically and economically feasible.

This particular planning effort being undertaken includes an inventory and assessment of the natural resource base and sediment quality data from the Suamico Harbor area, and results in the development of recommendations for environmentally and economically sound disposal options for materials dredged from the river mouth and harbor channel area.

It must also be noted that sediments are classified as either unpolluted, moderately polluted, or heavily polluted. While the Wisconsin Department of Natural Resources (WDNR) recognizes these guidelines, they are not presently being used for sediment quality analysis of dredge material in Wisconsin. Rather, the WDNR has issued interim guidelines with respect to metals, organic pollutants, and other contaminants in order to

assess the pollutant content of dredge material as it relates to potential disposal options.¹

¹Wisconsin is presently in the process of revising NR 347 of the Wisconsin Administrative Code to include WDNR's own standards for evaluating sediments.

SECTION 2

INVENTORY AND ANALYSIS

Physical Setting

Location

The Suamico Harbor facilities are located in the Town of Suamico, which is located about eight miles north of the Green Bay Harbor, on the west shore of Green Bay. It is also the northern most minor civil division in Brown County.

U.S. Highway 141-41, provides the Town of Suamico with a convenient southerly route to Green Bay and a northerly route to Oconto, Marinette and the upper peninsula of Michigan. Included within the town's boundaries are the Brown County Reforestation Camp and Barkhausen Waterfowl Preserve, the State of Wisconsin West Shore Wildlife Area, Little Tail and Long Tail Points extending southeasterly into Green Bay, large wooded areas, and the Suamico River (see Map 1).

Political Jurisdiction

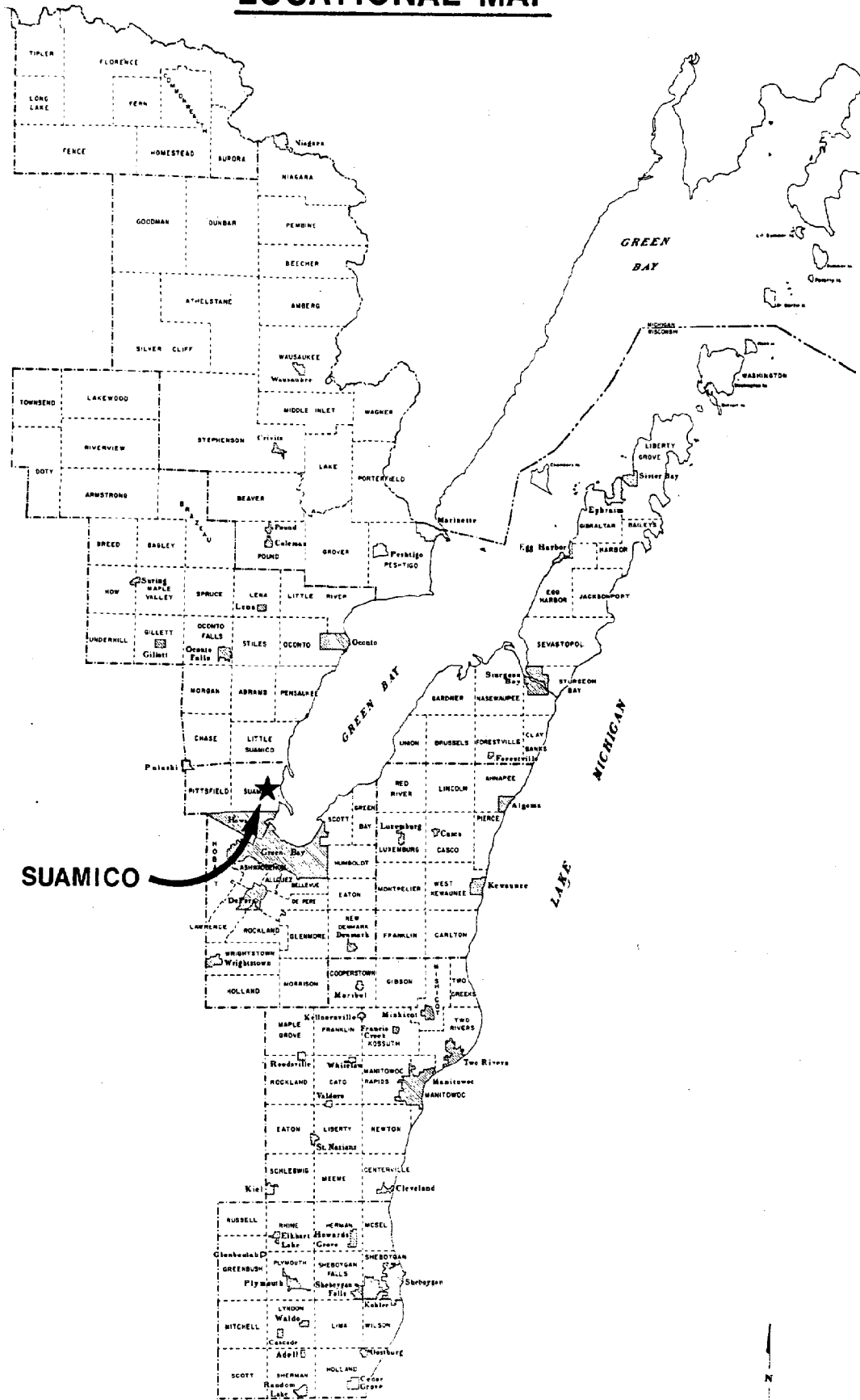
The Town of Suamico, a corporate body, exercises its corporate powers through Chapter 60 of the Wisconsin State Statutes. The Town Board consists of a Chairman and two Supervisors. Town officers include a clerk, treasurer, assessor and constable.

Chapter 30 of the Wisconsin State Statutes provides a Town Board the statutory authority to establish a Harbor Commission. Harbor Commissions often are given the responsibility for harbor planning, repairs and maintenance. They have exclusive control of the commercial aspects of day to day operations, setting fees and promoting harbors. The activities of the harbor commission are set by resolution of the Town Board and are limited to those items specifically identified in the resolution. All planning and fiscal activity are under the control of the harbor commission but expenditures are subject to the approval of the Town Board. The Town of Suamico has established a Harbor Commission.

Topography & Geology

The western portion of the Town of Suamico has a rolling topography formed by Valderan glacial ground moraine underlain by Mid-Woodfordian glacial deposits. Nearly level, sandy, glacial lake sediment dominate the east. Dunes formed by wind transported sediments are scattered in a north-south band through the central portion of the Town and along the western shore of the bay. Approximately six small sand and gravel pits are found within the Town of Suamico. The pits utilize the sand and gravel deposits associated with those glacial depositions.

MAP 1 LOCATIONAL MAP



SUAMICO

Soils
Soil Conditions - Brown County

Map 2 delineates the general soil associations that exist in Brown County. A soil association is a landscape that has a distinctive proportional pattern of soils. This map is useful in showing a general picture of the soils of the county and for comparing soil differences in relation to their surface and subsurface geological features. A discussion of the general characteristics of the 10 soil associations is in the following. The descriptions of the soil associations were taken from the Soil Survey of Brown County, Wisconsin.

1. Kewaunee - Manawa Association

This association consists of gently sloping to steep soils on glacial till plains and ridges, and of nearly level or very gently sloping soils in depressions and drainageways. The soils are deep and vary from well drained to somewhat poorly drained.

This association occupies about 39 percent of the county. Kewaunee soils make up about 62 percent of this association, Manawa soils about 15 percent, and minor soils, the remaining 23 percent.

The subsoil is dominantly a reddish-brown heavy clay loam or silty clay. The clay subsoil and substratum severely limit the use of these soils for home sites or other non-farm purposes.

If the soils are used as a site for a septic tank disposal field, overflow is likely to occur because of the slow permeability of the soil. Also, the high shrink-swell capacity of the soil affects excavation and stability where a foundation is to be constructed.

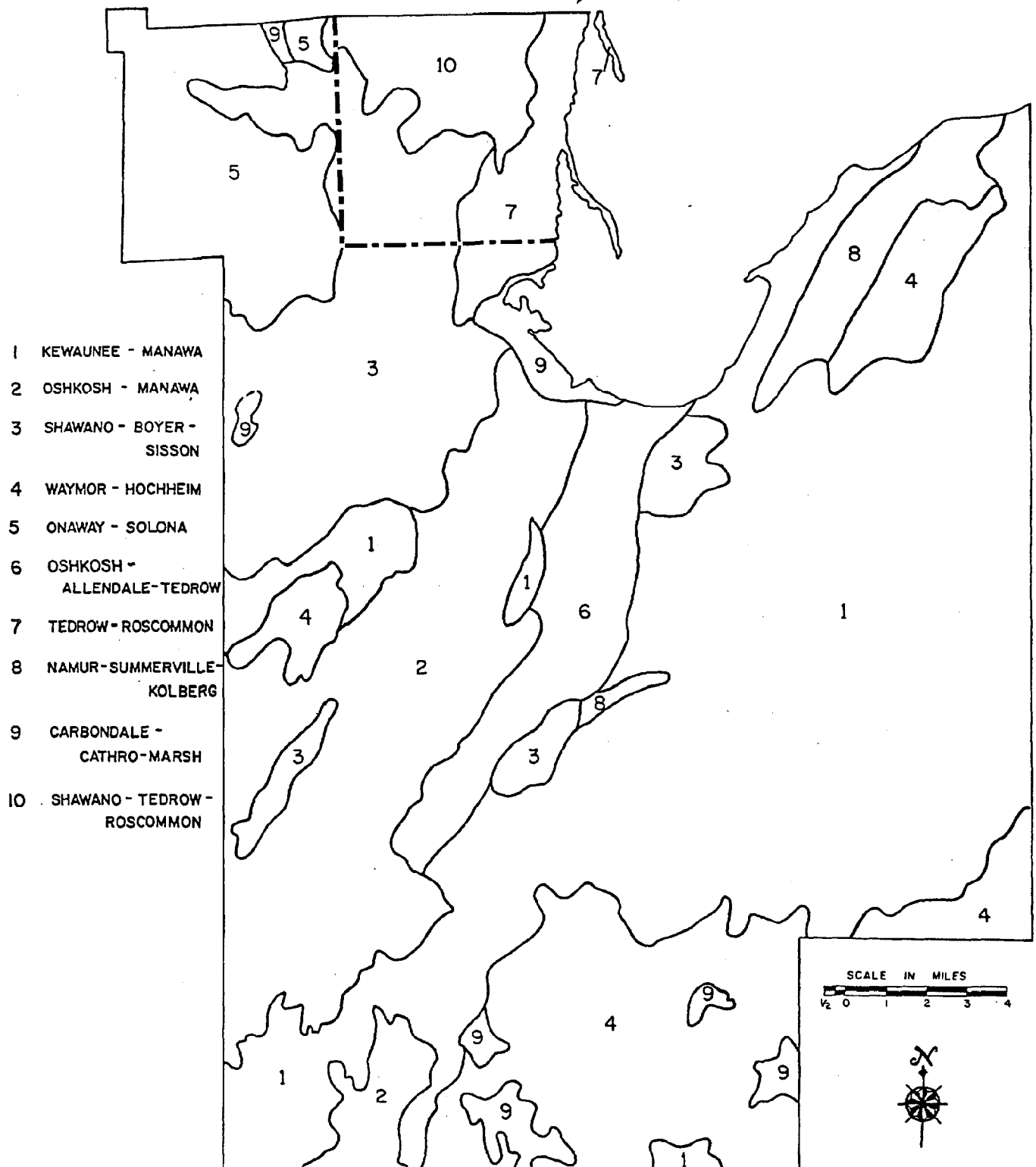
The soils throughout most of this association are cultivated and are suited to all the crops commonly grown in the county. Uncultivated areas are generally in pasture or are wooded. Controlling erosion on the Kewaunee soils and providing drainage on the Manawa soils are important management concerns. Maintaining soil fertility is a management concern for both the soils.

2. Oshkosh - Manawa Association

This association consist of deep soils varying from well drained to somewhat poorly drained. It has nearly level to steep soils that have a dominantly clay subsoil. These soils are found on glacial lake plains dissected by narrow V-shaped valleys. This soil's association occupies about 16 percent of the county.

MAP 2 SOIL ASSOCIATIONS BROWN COUNTY

Town of Suamico



Oshkosh soils make up about 60 percent of this association, Manawa soils about 9 percent, and minor soils, the remaining 31 percent.

The soils throughout most of this association are cultivated and suited to all the crops commonly grown in the county. Controlling erosion on the Oshkosh soils and providing drainage on the Manawa soils are primary concerns in management. Maintaining soil fertility in this association is necessary for the satisfactory growth of plants.

The clay subsoil and substratum of soils in this association severely limits their use for homes and other non-farm purposes. These soils present severe limitations for use as disposal fields of septic systems, and the shrink-swell potential affects the use of the soils for excavation where a foundation is to be constructed.

3. Shawano - Boyer - Sisson Association

This association consists of nearly level soils on glacial lake plains and outwash plains and of gently sloping to steep soils on outwash ridges. It occupies about 13 percent of the county.

Shawano soils make up about 10 percent of the association; Boyer soils, 8 percent; Sisson soils, 6 percent; and minor soils the remaining 76 percent. This soil association is characterized by soils with a sandy to loamy subsoil and substratum.

Sisson soils are well-suited to crops and are often used for vegetable crops. Erosion, fertility, and drought are problems when the Shawano and Boyer soils are cleared for cultivation. Use of the soils in the association varies from woodland to farmland to urban and suburban development. The soils in this association have slight to moderate limitations for septic system filter fields and for foundations for buildings.

4. Waymor - Hochheim Association

This association consists of deep, well drained, nearly level to moderately steep soils that have a loamy subsoil. It is found on glacial till plains and ridges and occupies about 12 percent of the county.

Waymor soils make up about 60 percent of this association, and Hochheim soils, about 8 percent. The remaining 32 percent is composed of minor soils.

Most of this association is used for dairy farming. The soils are well-suited to all the crops commonly grown in Brown County. Controlling erosion and maintaining fertility are the main concerns in managing cultivated areas. Soils of this

association are often well-suited to urban and suburban development.

5. Onaway - Solona Association

This association consists of nearly level to moderately steep soils with a loamy subsoil. These soils are found on glacial till plains and occupy about 6 percent of the county. Onaway soils make up about 55 percent of this association, Solona soils, 29 percent, and minor soils, the remaining 16 percent.

Most of this soil association is cultivated and used for farming. If crops are to grow well, protection from run-off and erosion is needed on the steeper soils, and artificial drainage is needed on the wet soils.

Solona soils have severe limitations for septic system disposal fields and moderate limitations for building due to the seasonal high water table. Onaway soils are capable of supporting urban and suburban development.

6. Oshkosh - Allendale - Tedrow Association

This association consists of soils of glacial lake plains in basins that have been influenced in places by recent flooding and overflow. It occupies about 4 percent of the county. Oshkosh soils make up about 30 percent of this association, Allendale soils, about 9 percent, Tedrow soils about 8 percent, and minor soils, the remaining 53 percent.

These soils have a clay to sandy subsoil; the Tedrow soil is associated with the sandy subsoil. Slow permeability and shrink-swell potentials are limitations to non-farm development on Oshkosh soil. Wetness limits development of the Allendale and Tedrow soils. Drainage, erosion control and maintaining fertility are agricultural management concerns in this association.

7. Tedrow - Roscommon Association

This association consists of nearly level soils and soils in depressions on former glacial lake bottoms and outwash plains. These soils are deep, poorly drained, and occupy about 3 percent of the county.

Tedrow soils make up about 50 percent of this association, Roscommon soils about 16 percent, and minor soils the remaining 34 percent. Both the Tedrow and the Roscommon soils were formed in deep sands. The soils in this association are low in natural fertility and commonly are poorly suited to crops. Much of this association is used for pasture or for low-quality woodlots. It is suitable for wildlife habitat, hunting, and other outdoor recreational uses, which are wise uses of these

soils, since they have severe limitations for structural development.

8. Namur - Summerville - Kolberg Association

This association consists of very shallow to moderately deep, nearly level to moderately steep soils that have a loamy to clayey subsoil. These soils are underlain by limestone bedrock and are found on glacial till plains. This association occupies about 3 percent of the county.

Namur soils make up about 30 percent of this association; Summerville soils, 20 percent; Kolberg soils, 11 percent; and minor soils the remaining 39 percent. Most of this association is wooded or in permanent pasture.

The deeper Kolberg soils are generally cultivated and with proper management produce good yields of crops commonly grown in the county. Controlling erosion and maintaining good tilth are a main concern in cultivated areas. Shallow depths to bedrock and steep slope often restrict non-farm development.

9. Carbondale - Cathro - Marsh Association

This association consists of very poorly drained, nearly level organic soils and marshes on plains and in depressions. It occupies about 2 percent of the county. Carbondale soils make up about 52 percent of this association; Cathro soils, 24 percent, Marsh land, 18 percent; and minor soils the remaining 6 percent. Most of these soils are covered with water-tolerant grasses and shrubs. Use of these soils for urban or rural development is severely limited. Wildlife management should be promoted in these areas.

10. Shawano - Tedrow - Roscommon Association

This association consists of soils on lake plains, outwash plains, and stabilized dune ridges. These soils were formed in deep sands and, consequently, have a sandy subsoil. This association occupies about 2 percent of the county.

Shawano soils make up 50 percent of this association; Tedrow soils, 12 percent; Roscommon Soils, 13 percent; and minor soils, the remaining 25 percent.

The soils of this association are generally poorly suited for farming. These soils are much better suited to growing trees than crops. Cleared areas have been planted in conifers; i.e., pine and spruce which grow well on these soils and help to control erosion. Soils in this association are among the best in the county for residential and community development.

Soil Conditions - Town of Suamico

A variety of soil types and conditions are found in the Town of Suamico. In the northern and western part of the town, the soils are predominantly Shawano loamy fine sand becoming Tedrow loamy fine sand and Roscommon loamy fine sand as one goes east. The eastern and southeastern portion of the town is almost entirely Tedrow and Roscommon loamy fine sands. The Shawano loamy fine sand soils are deep, excessively drained, found on sandy plains and having rapid permeability. These soils are subject to blowing when cultivated. Intermixed with the Shawano soils in the northern and western part of the town are found scattered areas of Alluvial soils, Onaway sandy loam, Keowns silt loam, Allendale loamy fine sand, Yahara fine sandy loam, Wauseon fine sandy loam, Boyer loamy fine sand, Manistee loamy fine sand, Solona sandy loam, and Shawano fine sand. The Tedrow loamy fine sand soils are deep, somewhat poorly drained, and found on sandy lacustrine plains. These soils have rapid permeability and run-off is slow. Wetness is the main hazard when cultivating these soils. The Roscommon loamy fine sand soils are deep, poorly drained, found in depressions on sandy plains and have rapid permeability. Wetness is also a hazard when cultivating these soils. Slopes are mostly zero to six percent. Except for some large and scattered areas of Kewaunee, Keowns, and Sisson silt loam and Manawa silty clay loam, Onaway loam, Onaway sandy loam, and Boyer loamy fine sand soils, the majority of the Town of Suamico has soils not well suited to the crops commonly grown in Brown County and, therefore, are not considered prime agricultural soils. The soils listed above have agricultural capability class ratings 2 and 3, while the remainder of the soils within the town have agricultural capability class ratings 4, 5, and 6.

The soils throughout the eastern part of the Town of Suamico have severe to very severe limitations for on-site sanitary systems, due to high water tables and seasonal high water tables. The soils in the western part of the Town of Suamico range from having slight limitations to very severe limitations for on-site sanitary systems. The Onaway sandy loam soils have slight limitations, while the Shawano loamy fine sand and fine sand have moderate limitations and the Boyer loamy fine sand has moderate limitations. However, the Onaway, Shawano and Boyer soils cover much of the western part of the town. The limitations on the soils rated severe to very severe are mainly due to high water table or seasonally high water table.

Water Resources

Suamico River

The Suamico River watershed has an area of 45.7 square miles or 29,242 acres in Brown County. The total drainage area of the Suamico River is about 70 square miles with 2.87 square miles in Oconto County, 8.6 square miles in Shawano County, with the remainder in Outagamie County. The lower two-thirds of the Suamico River flows in a general easterly direction discharging into Green Bay. The Suamico River's headwaters originate in Outagamie County and are at an elevation of 860 feet above msl. The river flows about 20 miles, discharging into Green Bay at an elevation of 580 feet above msl. This represents a fall of 280 feet, giving it a gradient of about 14 feet per mile.

The backwater effect from the Bay is reported to extend upstream approximately 3 miles above the mouth of the river. Very limited flow records for the Suamico River are available. There are presently no known users of the Suamico River water except for waste assimilation and stock watering purposes.

Water Related Recreational Uses

Public recreational facilities consist of a 2.3 acre, county-owned boat landing on the north bank of the Suamico River at the upstream limits of the federal navigation project and is located approximately 1,600 feet above the river's mouth. Facilities provided at the boat landing include 1 launch lane, parking for 35 cars and toilets. Water depth at the launch lane is approximately 3 feet, however lower depths are experienced in places along the shoreline primarily due to erosion and siltation. There are approximately 10 private boat rental slips along the river. Map 3 delineates the locations of the recreational boating facilities that are found adjacent to the harbor area.

TABLE 1

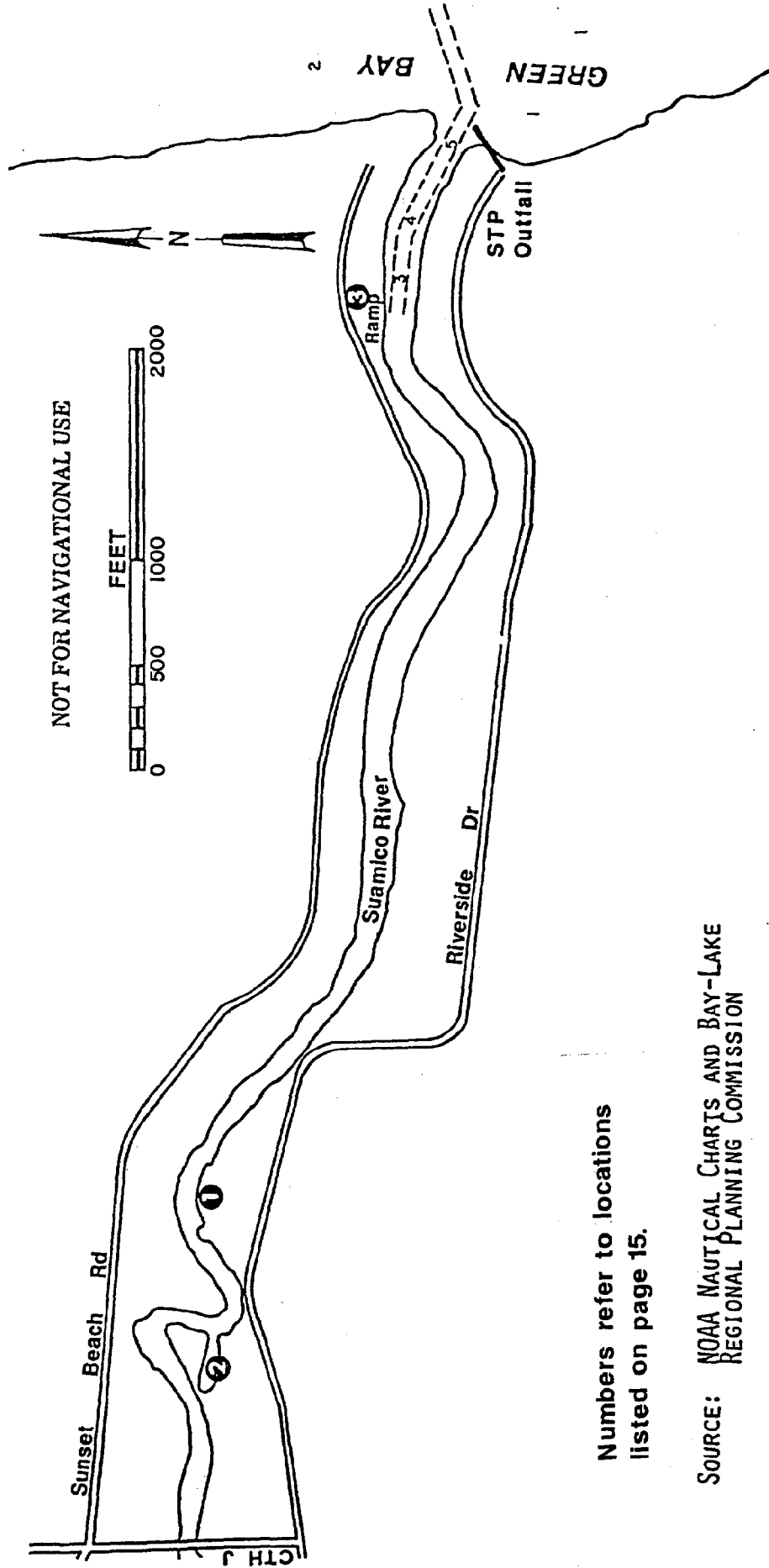
PUBLIC AND PRIVATE RECREATION BOATING FACILITIES SUAMICO HARBOR

Name/Location	Ownership
1. DeWitt Marina	Private
2. Whale's Tale Marina	Private
3. Brown County Boat	Public

Sources: Brown County Planning Commission, Brown County Marina Report.

MAP 3 PUBLIC AND PRIVATE RECREATIONAL BOATING FACILITIES AND PUBLIC PARKS

SUAMICO HARBOR
Brown County, Wisconsin



Numbers refer to locations
listed on page 15.

SOURCE: NOAA NAUTICAL CHARTS AND BAY-LAKE
REGIONAL PLANNING COMMISSION

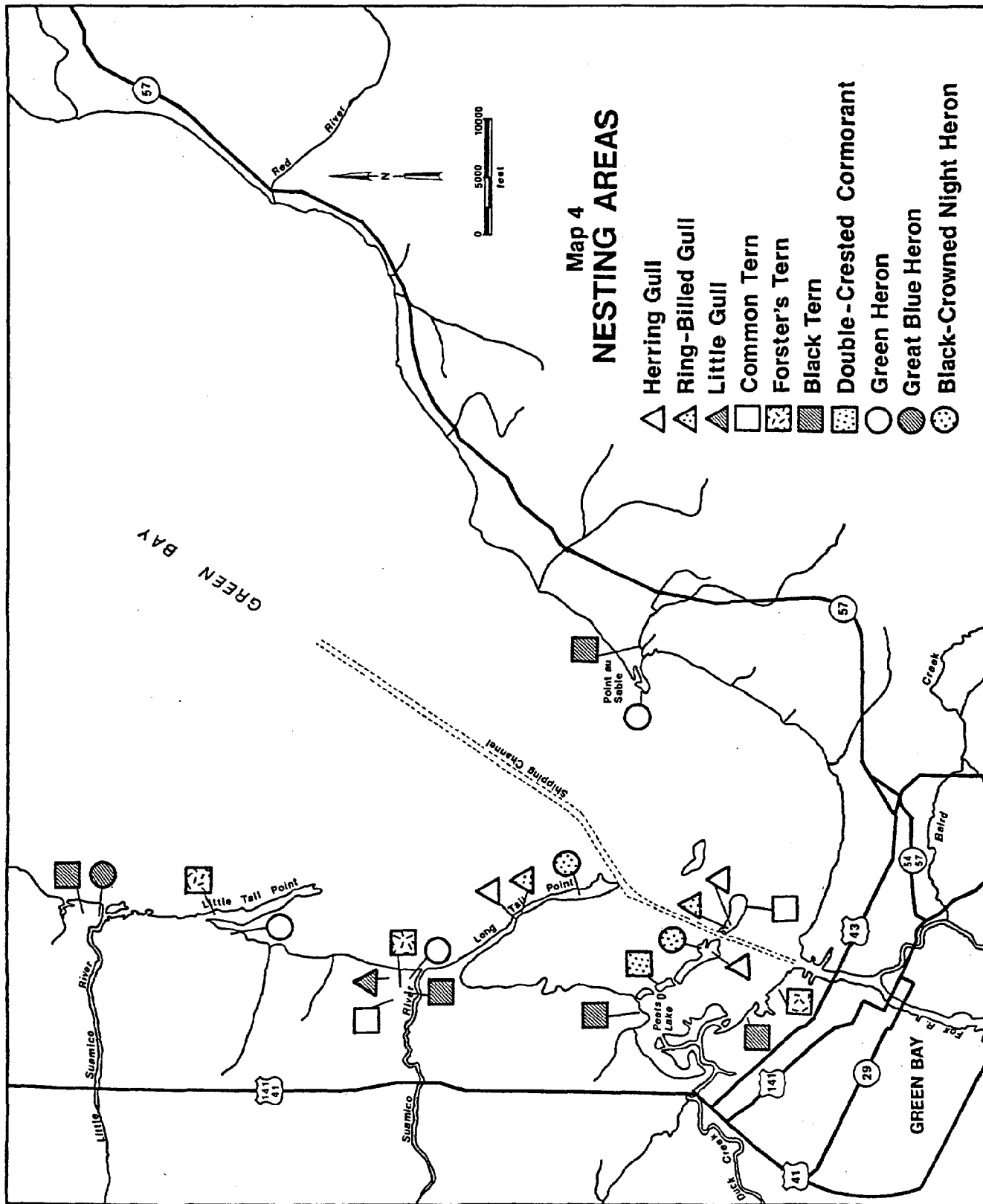
Water Resources, Wildlife and Vegetation

The bay of Green Bay is the most dominant surface water resource in the Town of Suamico. The bay constitutes the eastern boundary of the Town and provides thousands of acres of wetlands along the eastern edge. These wetlands provide valuable habitat for waterfowl, upland birds, and mammals. Significant water birds that breed in these wetlands including "little gulls" (see Map 4). Studies indicate that only two or three colonies of little gulls exist in the United States. Forster's terns also breed in this area and only three colonies of any size of this species are known to exist in Wisconsin. Many significant migrants also use these wetlands. The peregrine falcon, which is on the endangered species list for Wisconsin and the United States, and the bald eagle have both been sighted along the west shore wetlands. In addition, a great number of diversity of songbirds and waterfowl inhabit the area. These wetlands are used by many diverse species of mammals, and are known throughout the midwest for their important habitat functions.

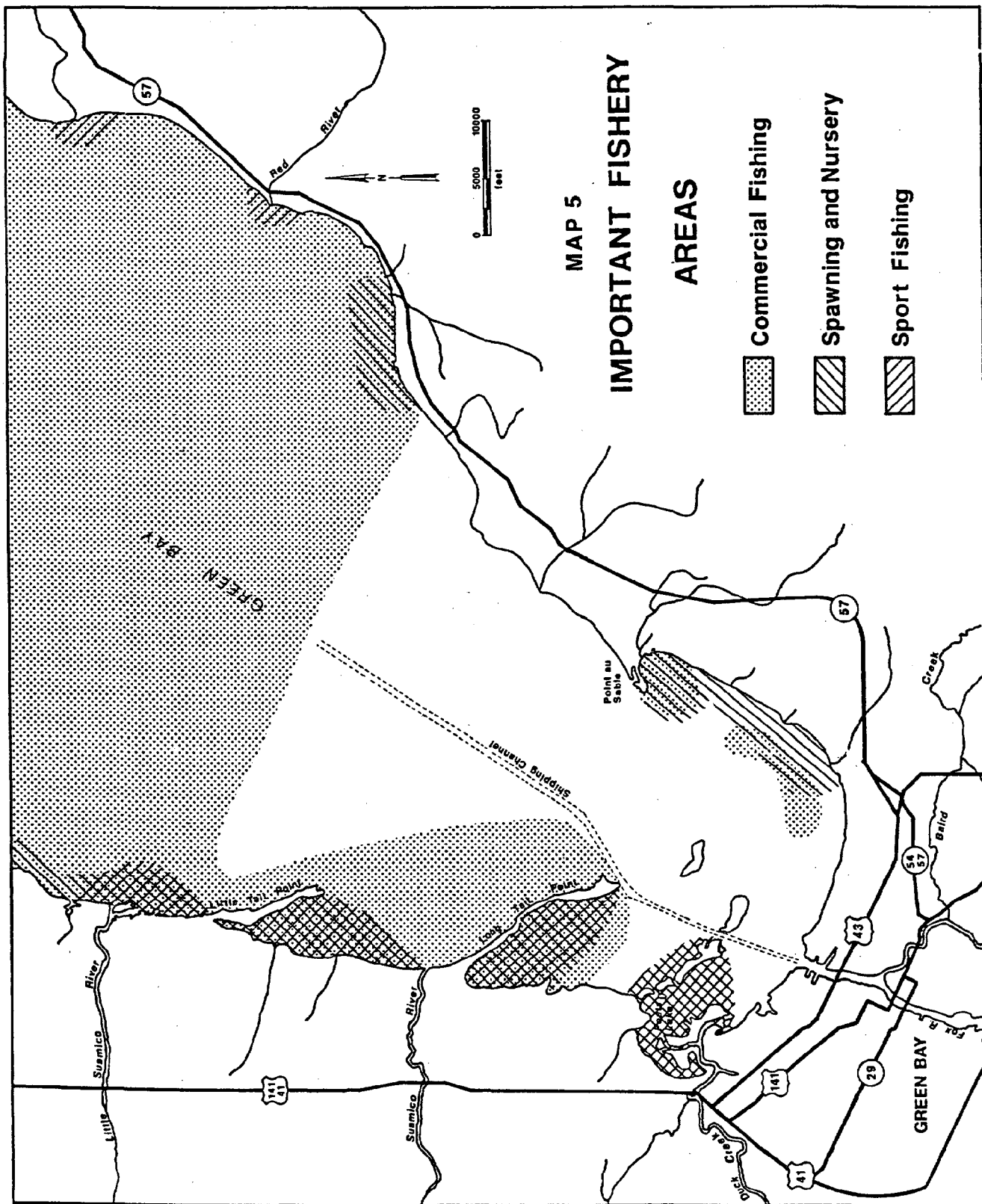
Another major water resource in the Town is the Suamico River. The Suamico River changes from a clear, bubbling stream at its headwaters (19.4 miles from its entrance into the bay of Green Bay) to a relatively sluggish, wide, and muddy stream at its mouth. Some of the stream's turbidity is due to bank erosion from cattle pasturing. The upper two-thirds has a rubble and gravel bottom containing many invertebrates and an abundance of crayfish. The lower portion has a sand and silt bottom without many organisms. The fishery on the river's lower end is approximately the same as found in the bay of Green Bay (see Map 5). The Suamico River and its wooded valley and associated ravines add much to the scenic nature of the Town.

Several ponds and lagoons are also located in the Town of Suamico. There are two lagoons located within the Barkhausen Waterfowl Refuge. These lagoons help provide refuge for migratory Canadian geese and a variety of North American duck. A small lake can be found adjacent to State Highway 41-141 in Section 27. Another small lake is located in Section 20.

The Town of Suamico has the greatest amount of land covered by woodlots within Brown County. In fact, in 1970, 8,914 acres of wooded and vacant land or about 13 percent of 67,278 total acres of woodlot and vacant land in the county, was found in the Town of Suamico. The vegetation within the town varies markedly. The vegetation on the glacial moraine in the western part of the town is characterized by mature stands of white pine, red maple, oaks, and other species in dry mesic classifications. The vegetation in the wetlands of the east portion consists largely of willows, cottonwoods, ash, aspen, and other wet and successional types of vegetation.



Source: "Green Bay Estuary Study," U.S. Fish and Wildlife Service.



Source: "Green Bay Estuary Study", U.S. Fish and Wildlife Service

Vegetation along the bayshore varies from submergents to Shrub Swamps. Inland there is a gradation to Southern Wet and Southern Wet Mesic vegetation. Nearing CTH "J", the Aspen/Ash classification dominates in many areas. On Little-Tail and Long-Tail Points, the vegetation is similar to the shore areas.

The vegetation along the Suamico River is largely classed as a Tension Wet Mesic or Southern Wet Mesic forest. The land north of the Suamico River and west of State Highway 41-141 is nearly entirely wooded. This tract includes the Brown County Reforestation Camp, which has numerous acres of Norway pine, jack pine, and white pine planted from the year 1942 and after. Natural vegetation in the Reforestation Camp varies from wet lowland communities dominated by American elm, black ash, and trembling aspen to drier highland communities of aspen, paper birch, and red maple with scattered native white pine, red pine, and red oak. The vegetation south of the Suamico River and west of CTH "HS" is similar, but is not as abundant as that in the northwest quadrant of the town.

Climate

The climate of the Town of Suamico is continental and is characterized by marked changes in the weather that are common to locations in the interior of large land masses of the middle latitudes. The nearby waters of Green Bay and to some extent Lake Michigan, exert a modifying influence on the climate. In spring months when northeast winds are common, these waters do have an effect on cooling the area. But conversely, during the late fall months, these waters provide a warming effect to the area. Winters are cold and snowy but summers are mostly warm with some periods that are hot and humid.

The average annual precipitation approximates 26 inches, most of which falls in the five month period of May to September. Annual precipitation varies considerably; one year in ten will likely have as much as 6.5 inches more or less than the average. Snowfalls occur from October to May, but occur most frequently from December through March. Snowfall averages about 40 inches in a season.

The growing season, defined as the number of days between the last freeze in the spring and the first in the fall, averages 161 days. Prevailing winds are from the northwest in winter and from the southwest for the remaining months. The average wind speed ranges from 13 miles per hour in April and November to 10 miles per hour in August. Extreme winds usually blow from the west, southwest, or south.

Land Use

Generalized Land Use Conditions - Town of Suamico

In 1980, the Town of Suamico had over 1,700 acres in residential use, 72 acres in commercial use, 30 acres in industrial use, over 2,400 acres in outdoor recreation or open space use, almost 6,000 acres in a natural state and almost 12,000 acres in agricultural production. These acreage figures amount to over seven percent of the town devoted to residential use, 10.4 percent to outdoor recreation in a natural state and 51 percent in agricultural use (see Tables 2 & 3).

Suamico is not a typical rural agricultural community with Brown County. A large concentration of residential subdivisions and scattered residential non-farm residences are located within the town. Also, dense residential development is located along the bay shore as well as in the unincorporated community of Suamico. A generalized land use map for the Town has been developed and is identified as Map 6.

Generalized Land Use Conditions - Suamico Harbor Area

This section describes the various land uses adjacent to the Suamico River, from the river's mouth to the fixed CTH J highway bridge. Development along the river occurs in two clusters separated by farmland and woodland. The first development is located adjacent to the dredged river channel and the upstream limits of the federal navigation project. Development consists of single family residences, marinas, and commercial fishing facilities. In general, development along the river consists of one tier development between the shoreline and roadways, which parallel the shoreline. Land uses to the north and south of the river consist of wetlands, woodlands and farmland. Map 7 identifies the various land uses that are found adjacent to the harbor area.

Starting at the river's mouth on the south bank, land uses consist of a 3,200 foot strip of residential development with berthing facilities for commercial fishing boats. The next 1,600 feet of shoreline is occupied by a mink farm.

Land uses along the next 2,800 feet of shoreline to the CTH J bridge consist of a mix of residential structures, small boat marinas, and commercial fishing facilities.

Starting at the river's mouth on the north shore, land uses consist of a 1,200 foot strip of residential development. The next 800 feet of shoreline consist of commercial fishing docks and a public launch with parking. The next 2,000 feet of shoreline is vacant and is comprised of woodlands that are followed by a 3,100 foot strip of land that is comprised of low density development consisting of six residences, farmland, and commercial fishing docks.

Table 2
BROWN COUNTY LAND USE
1980
ACREAGE

	Residential	Commercial	Industrial	Inst./Gov.	Transp.	Out. Rec.	Natural	Agricultural	Total
TOWNS									
Allouez	1,132,111	67,910	6,228	204,616	509,788	272,438	634,400	51,595	2,879,086
Bellevue	727,678	170,912	45,130	3,197	763,671	40,352	741,093	6,646,229	9,138,262
De Pere	546,008	42,905	217,833	14,543	652,955	145,526	1,314,768	8,341,335	11,275,873
Eaton	378,878	20,409	12,919	19,829	520,585	140,150	696,387	13,572,627	15,361,784
Glenmore	343,714	38,169	66,593	16,199	635,878	3,330	1,035,813	18,633,746	20,773,442
Green Bay	370,860	25,041	11,005	17,198	494,293	70,370	2,517,318	10,465,875	13,971,960
Hobart	1,359,169	34,234	140,741	913,510	848,742	310,726	3,590,906	14,380,839	21,578,867
Holland	373,934	29,669	21,134	12,745	517,057	549,330	3,939,683	17,391,683	23,040,376
Humboldt	439,572	19,386	14,586	13,888	722,198	40,000	841,271	13,474,755	15,360,515
Lawrence	440,678	19,199	83,265	35,660	774,135	194,250	319,090	9,886,571	11,752,848
Morrison	446,734	21,017	16,388	39,659	631,400	38,600	3,529,357	18,317,345	23,040,500
New Denmark	510,700	85,569	185,921	38,176	1,084,778	442,070	2,255,570	17,447,158	22,049,942
Pittsfield	821,799	21,940	67,632	97,267	737,237	120,000	2,663,172	17,027,934	21,556,981
Rockland	336,765	5,940	8,238	1,000	466,830	31,119	825,368	12,461,428	14,136,688
Scott	536,692	28,849	80,386	123,178	525,130	138,454	2,475,382	8,396,398	12,304,469
Suamico	1,708,140	72,472	30,469	53,173	1,178,634	2,433,328	5,920,016	11,967,188	23,363,420
Wrightstown	448,967	37,770	20,509	13,195	695,294	73,939	2,037,232	18,346,331	21,673,237
TOWN TOTAL	10,922,399	741,391	1,028,977	1,617,033	11,758,605	5,043,982	35,336,826	216,809,037	283,258,250
VILLAGES									
Ashwaubenon	1,113,545	502,387	403,336	368,047	1,344,881	149,207	1,673,962	437,485	5,992,850
Denmark	170,002	28,813	15,309	48,445	127,599	45,531	87,327	463,312	986,338
Howard	1,236,625	253,256	198,100	130,249	1,361,362	176,015	4,192,900	4,561,293	12,109,800
Pulaski	185,567	24,916	37,703	91,021	178,545	30,793	105,133	344,278	997,956
Wrightstown	153,568	21,789	7,234	51,685	116,794	22,205	346,880	645,103	1,365,258
CITIES									
De Pere	1,105,222	228,373	191,745	323,914	816,717	127,583	1,122,890	1,196,710	5,113,154
Green Bay	5,947,920	905,714	1,972,924	1,165,169	4,719,093	1,765,649	472,430	11,670,845	28,619,744
URBAN TOTAL	9,912,449	1,965,248	2,826,351	2,178,530	8,664,991	2,316,983	8,001,522	19,319,026	55,185,100
METRO AREA TOTAL	11,799,792	2,157,401	2,897,849	2,318,370	10,040,642	2,669,699	11,313,057	32,960,555	76,163,038
COUNTY TOTAL	20,834,848	2,706,639	3,855,328	3,795,563	20,423,596	7,360,965	43,338,348	236,128,063	338,443,350

Source: Brown County Planning Commission

- NOTES:
1. Residential includes single family, two family, and multi-family.
 2. Industrial includes light industry, heavy industry, mining, and excavation.
 3. Transportation includes railroads, roadways, and streets.
 4. Natural includes woodland, vacant land, and river area.
 5. Outdoor Recreation includes park and recreation open space and quasi-public open space.
 6. Institutional/Governmental includes schools, public buildings, churches, institutions, and cemeteries.

Table 3

BROWN COUNTY LAND USE
1980
PERCENTAGE

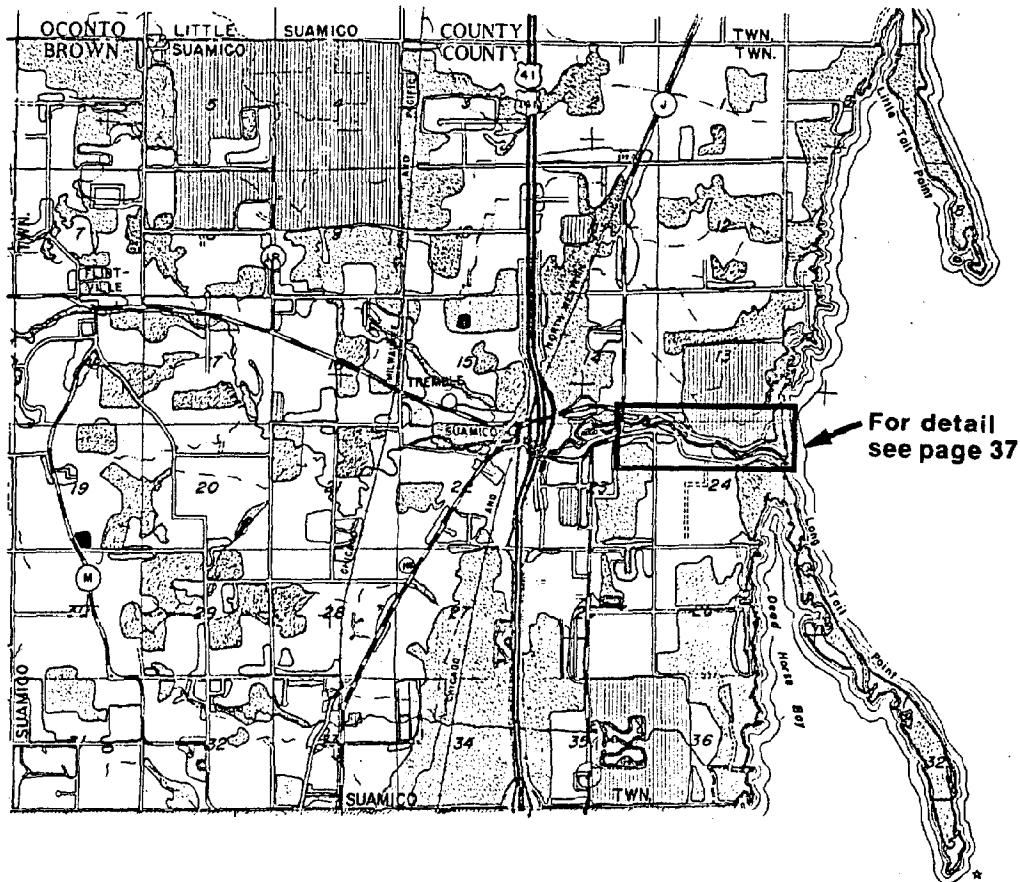
	Residential	Commercial	Industrial	Inst./Gov.	Transp.	Out. Rec.	Natural	Agricultural	Total
TOWNS									
Allouez	39.328	2.368	0.228	7.118	17.718	9.468	22.038	1.798	100.008
Bellevue	7.968	1.878	0.498	0.048	8.368	0.448	8.118	72.738	100.008
De Pere	4.848	0.388	1.938	0.138	5.798	1.298	11.668	73.988	100.008
Eaton	2.478	0.138	0.098	0.138	3.398	0.918	4.538	88.358	100.008
Glenmore	1.658	0.188	0.328	0.088	3.068	0.028	4.998	89.708	100.008
Green Bay	2.658	0.188	0.088	0.128	3.548	0.508	18.028	74.918	100.008
Hobart	6.308	0.168	0.658	4.248	3.938	1.448	16.648	66.648	100.008
Holland	1.628	0.138	0.098	0.068	3.148	2.388	17.108	75.488	100.008
Humboldt	2.868	0.138	0.098	0.098	3.378	0.268	5.488	87.728	100.008
Lawrence	3.758	0.168	0.718	0.308	6.598	1.658	2.728	84.128	100.008
Morrison	1.948	0.098	0.078	0.178	2.748	0.178	15.328	79.508	100.008
New Denmark	2.328	0.398	0.848	0.178	4.928	2.008	10.238	79.138	100.008
Pittsfield	3.818	0.108	0.318	0.458	3.428	0.568	12.368	78.998	100.008
Rockland	2.388	0.048	0.068	0.018	3.308	0.228	5.848	88.158	100.008
Scott	4.368	0.238	0.658	1.008	4.278	1.138	20.128	68.248	100.008
Suamico	7.318	0.318	0.138	0.238	5.048	10.428	25.348	51.228	100.008
Wrightstown	2.078	0.178	0.108	0.068	3.218	0.348	9.408	84.658	100.008
TOWN TOTAL	3.868	0.268	0.368	0.578	4.158	1.788	12.488	76.548	100.008
VILLAGES									
Ashwaubenon	18.588	8.398	6.738	6.148	22.448	2.498	27.938	7.308	100.008
Denmark	17.248	2.928	1.558	4.918	12.948	4.628	8.858	46.978	100.008
Howard	10.218	2.098	1.648	1.088	11.248	1.458	34.628	37.678	100.008
Pulaski	18.598	2.508	3.788	9.128	17.898	3.098	10.538	34.508	100.008
Wrightstown	11.258	1.608	0.538	3.788	8.558	1.638	25.418	47.258	100.008
CITIES									
De Pere	21.628	4.478	3.758	6.338	15.978	2.508	21.968	23.408	100.008
Green Bay	20.788	3.178	6.898	4.078	16.498	6.178	1.658	40.788	100.008
URBAN TOTAL	17.968	3.568	5.128	3.958	15.708	4.208	14.508	35.018	100.008
METRO AREA TOTAL	15.498	2.838	3.818	3.058	13.188	3.518	14.858	43.288	100.008
COUNTY TOTAL	6.168	0.808	1.148	1.128	6.038	2.178	12.818	69.778	100.008

Source: Brown County Planning Commission



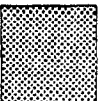





- NOTES:
1. Residential includes single family, two family, and multi-family.
 2. Industrial includes light industry, heavy industry, mining, and excavation.
 3. Transportation includes railroads, roadways, and streets.
 4. Natural includes woodland, vacant land, and river area.
 5. Outdoor Recreation includes park and recreation open space quasi-public open space.
 6. Institutional/Governmental includes schools, public buildings, churches, institutions, and cemeteries.

Generalized Land Use - 1980

TOWN OF SUAMICO



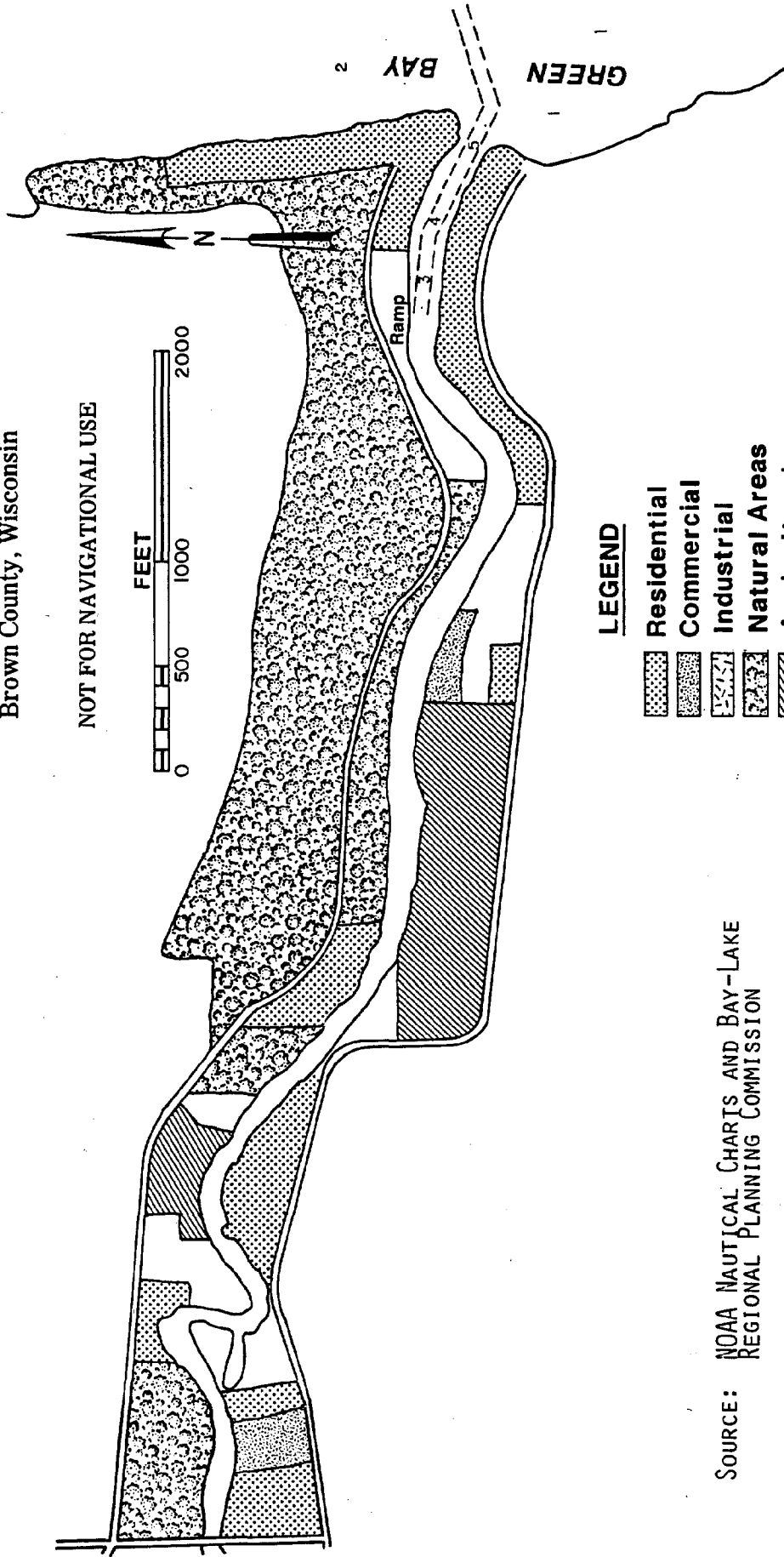
LEGEND

	— Residential		— Industrial
	— Churches & Institutions, Cemeteries, Schools & Public Bldgs., Airports		— Public Parks, Playgrounds & Open Space, Quasi-Public Open Space
	— Woodlands & Wetlands		— Mining & Extracting
	— Commercial		— Agriculture & Vacant Land

Source: Brown County Planning Commission.

MAP 7
LAND USE
SUAMICO HARBOR
 Brown County, Wisconsin

NOT FOR NAVIGATIONAL USE



- LEGEND**
- Residential
 - Commercial
 - Industrial
 - Natural Areas
 - Agricultural
 - Vacant/Other

SOURCE: NOAA NAUTICAL CHARTS AND BAY-LAKE
 REGIONAL PLANNING COMMISSION

Transportation

Within the Town of Suamico, U.S. Highway 41 and 141 provide the area with a major north-south transportation corridor. This four-lane highway is located .9 miles west of the river's mouth.

Two county highways, CTH J and CTH B, provide the harbor area with north-south and east-west transportation routes respectively. Sunset Beach Road provides a route north of the river to the bay, while Riverside Drive provides a similar route south of the river.

There are two airports open for public use that serve the Suamico area. Austin Straubel Airport, a large regional airport, is located approximately 7 miles southwest of the Suamico harbor area in the village of Ashwaubenon. Carter Airport, a small privately owned airport, is located about 5 miles west of the harbor in the Town of Pittsfield. Two privately owned airports, Plainview Airport and Bayside Airport, are located approximately 2 miles south and 1 mile north of the Suamico Harbor respectively and are available for private use only.

Two railroads, the Chicago and Northwestern Transportation Company and the Chicago, Milwaukee, St. Paul, and Pacific Railroad Company currently run on tracks through the Town of

Suamico. However, there is no direct rail service to the Suamico harbor area. Waterborne transportation originating from the Suamico harbor does not currently exist.

Population

The town has consistently grown in population since the 1930's. Between 1970 and 1980, Suamico's growth rate was 41.45 percent. The Wisconsin Department of Administration's population estimates indicate that between 1980 and 1984 the town grew from 4,003 to 4,462 people. A comparison of the Town's 1930-1980 population figures to the other minor civil divisions in Brown County is found on Table 4.

Based on the most recent Wisconsin Department of Administration (WDOA) population projections for the Town of Suamico indicate a rather significant rate of population growth through the year 2010. From the 1984 population estimate of 4,462, it is projected that the town population will increase by almost 80 percent to 8,015 by 2010 (see Table 5).

To accommodate this projected large increase in population, it has been estimated that over 2,000 acres of land would be needed for future residential development in the town. Of this total acreage, 650 acres can be expected for sewer development while the remaining 1,500 acres would be unsewered. At the present, there does not exist enough non-agricultural lands within the Town of Suamico to accommodate over 2,000 acres to be developed for residential use.

TABLE 4
SUMMARY POPULATION OF MINOR CIVIL DIVISIONS
Brown County, Wisconsin
1930-1980

	1930	1940	1950	1960	1970	1980
Alrouez (T)	2,621	3,561	5,315	9,557	13,753	14,882
Ashwaubenon (V)	685	900	1,088	2,657	10,042	14,486
Bellevue (T)	686	842	889	1,007	1,736	4,101
Denmark (V)	779	864	1,012	1,106	1,364	1,475
De Pere (C)	5,521	6,373	8,146	10,045	13,309	14,892
De Pere (T)	736	780	891	1,109	1,365	1,535
Eaton (T)	1,040	1,040	928	950	1,049	1,106
Glenmore (T)	1,082	953	981	1,035	1,110	1,046
Green Bay (C)	37,415	46,235	52,735	62,888	87,809	87,899
Preble (T)	4,074	4,116	7,176	12,245	*	*
Green Bay (T)	734	816	764	886	958	1,106
Hobart (T)	1,119	1,683	2,061	2,343	2,599	3,765
Holland (T)	1,041	1,068	1,016	1,078	1,211	1,286
Howard (V)	1,410	1,803	2,447	3,485	4,911	8,240
Humboldt (T)	890	876	893	908	1,011	1,281
Lawrence (T)	1,062	1,138	1,220	1,571	1,622	1,431
Morrison (T)	1,314	1,264	1,332	1,351	1,473	1,565
New Denmark (T)	1,293	1,254	1,186	1,189	1,203	1,420
Pittsfield (T)	1,147	1,181	1,108	1,273	1,647	2,219
Pulaski (V)	839	979	1,210	1,540	1,717	1,875
Rockland (T)	639	641	625	777	983	882
Scott (T)	1,005	1,402	1,626	1,869	1,969	1,929
Suamico (T)	1,214	1,318	1,654	2,073	2,830	4,003
Wrightstown (T)	1,291	1,304	1,250	1,301	1,463	1,705
Wrightstown (V)	612	718	761	840	1,020	1,169
Brown County	70,249	83,109	98,314	125,082	158,154	175,298

(C) = City, (T) = Town, (V) = Village

*Town of Preble was annexed to the City of Green Bay between 1960 and 1970.

Source: U.S. Census of Population

TABLE 5

Minor Civil Divisions	Population Projections				
	1990	1995	2000	2005	2010
T Allouez	16492	17061	17581	17947	18278
T Bellevue	5853	6686	7495	8590	9539
T De Pere	1718	1782	1836	1893	1944
T Eaton	1132	1114	1093	1075	1056
T Glenmore	1041	990	937	893	848
T Green Bay	1214	1285	1350	1399	1444
T Hobart	4920	5602	6275	6892	7499
T Holland	1338	1349	1354	1361	1363
T Humboldt	1485	1550	1607	1672	1732
T Lawrence	1322	1275	1224	1150	1077
T Morrison	1629	1629	1622	1616	1606
T New Denmark	1577	1677	1770	1837	1899
T Pittsfield	2812	3134	3445	3733	4013
T Rockland	877	833	788	748	708
T Scott	1887	1801	1713	1638	1562
T Suamico	5359	6044	6710	7367	8015
T Wrightstown	1997	2057	2103	2183	2256
V Ashwaubenon	16668	17639	18658	19621	20606
V Denmark	1615	1660	1698	1733	1763
V Howard	9957	10901	11900	12954	13998
V Pulaski	2081	2144	2197	2252	2300
V Wrightstown	1317	1362	1401	1443	1481
C De Pere	17346	18316	19190	20033	20802
C Green Bay	91866	91739	91290	90856	90219
COUNTY TOTALS	193503	199630	205237	210786	216008

Archeological and Historical Sites

Within the Town of Suamico, approximately 57 historical and archeological sites exist, along with three historical structures. Of these sites, several are located within the dredge disposal study area.

Economic Characteristics Introduction

As a portion of the Overall Economic Development Program, the Bay-Lake Regional Planning Commission recognizes the fact that there are specific urban centers in the region that provide the potential for economic growth and development beyond their respective boundaries. Within the 1980 OEDP Annual Report, five economic development growth centers were identified. These included the city of Green Bay urban area as the largest economic development center, and the urban areas associated with the cities of Sheboygan, Manitowoc, Marinette, and Sturgeon Bay.

Location of Growth Centers

The Green Bay urban area growth center is comprised of the cities of Green Bay and De Pere, the villages of Ashwaubenon, Allouez, and Howard, and the towns of Bellevue, Hobart, and Suamico (see Map 8).

Water Related Industrial and Commercial Uses in the Harbor Area

The only commercial activity that exists in the Suamico Harbor area is commercial fishing. There are currently no industrial uses in the immediate harbor area.

Proposed Economic Activities

As part of the 1986 OEDP Annual Report, several potential community projects were identified for the Town of Suamico. These include: utility improvements for industrial development; commercial redevelopment; and harbor improvements.

[illegible]

SECTION 3

EXISTING DREDGING INFORMATION

Past Dredging Efforts

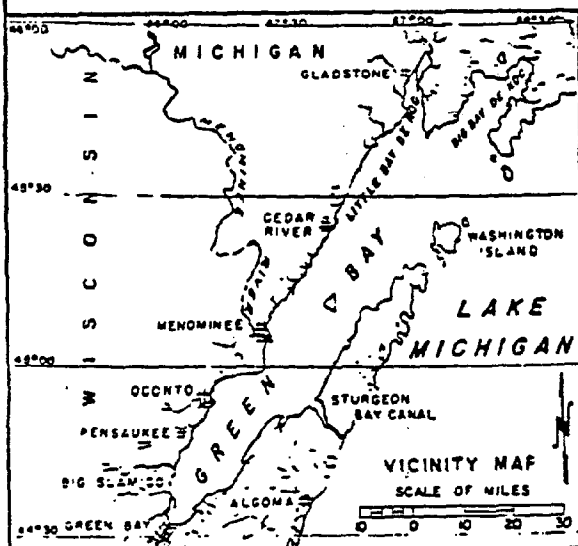
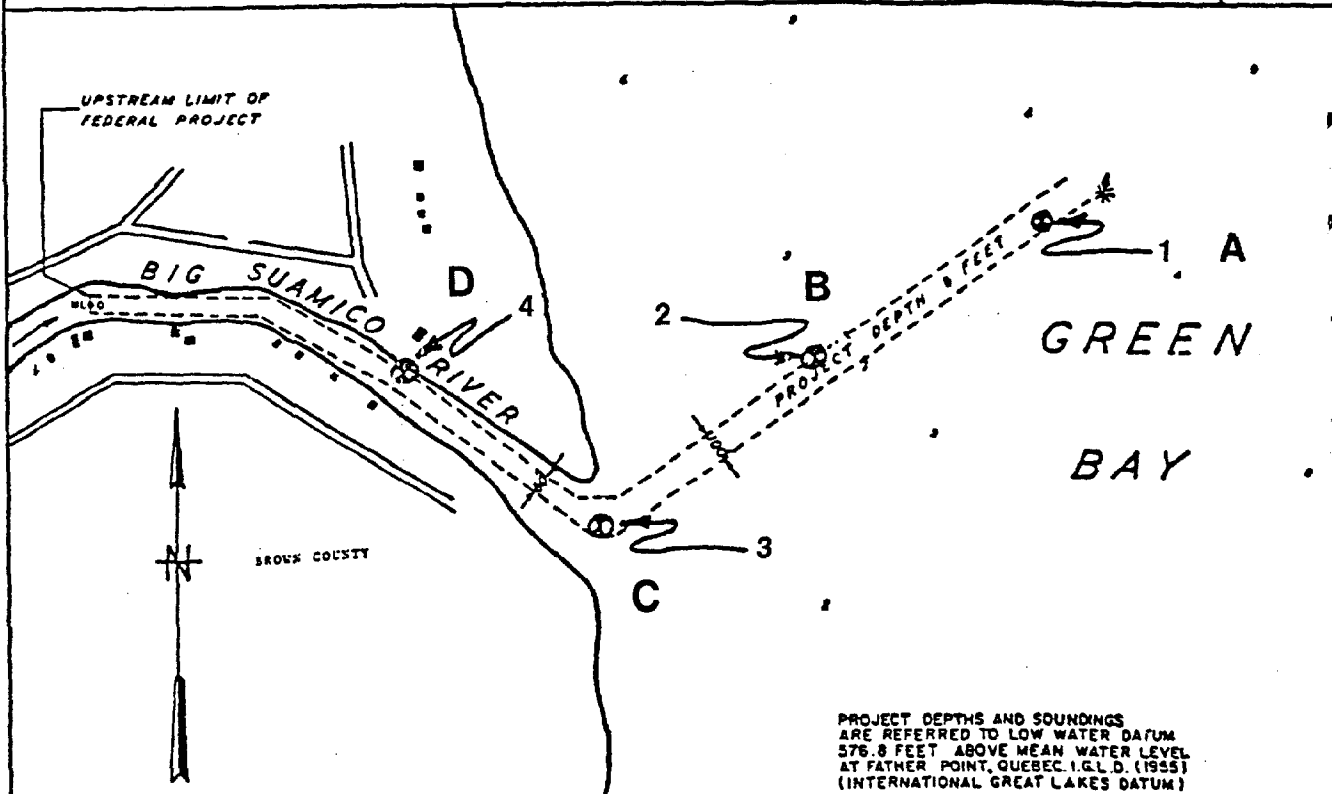
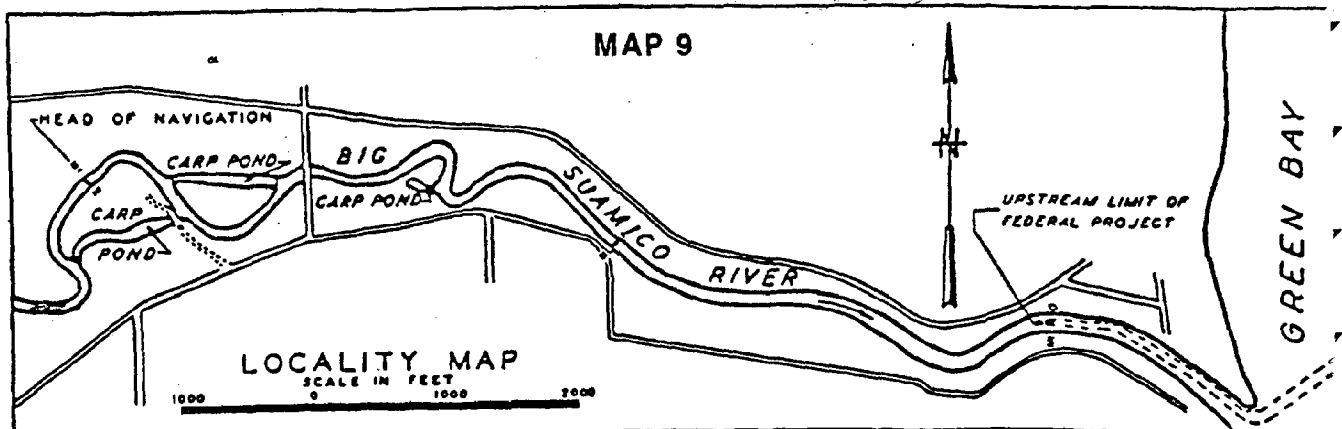
The Big Suamico Harbor has been dredged three times in the past 30 years as part of the U.S. Army Corps of Engineers dredging program. The frequency of these dredging efforts and the exact amount of material dredged are identified in the following:

<u>Fiscal Year</u>	<u>Cubic Yards</u>
1957	6,815
1961	9,575
1965	<u>12,772</u>
Total	29,162

The U.S. Army Corps of Engineers has revised the dredging frequency for the Big Suamico area and is now scheduled at 20 year intervals. Based on this revised interval, the harbor area should have been dredged in 1985.

Sediment Data

Map 9 and Tables 5-13 are the most recent test data of sediment conditions that has been compiled by the Corps of Engineers. The Suamico harbor is scheduled for re-sampling of sediment data in 1989. In addition to the most recent test data, the interim criteria, as developed by WDNR for in-water disposal of specified substances are also listed for comparison purposes (see Table 9).



ACTS
1937

AUTHORIZING DOCUMENTS
H. DOC. 498, 74th CONG., 2d SE-S.

BIG SUAMICO RIVER WISCONSIN

IN 1 SHEET

SHEET NO. 1



U. S. ARMY ENGINEER DISTRICT, DETROIT
30 SEPTEMBER 1968

TABLE 6

BENTHOS ANALYSIS
SUAMICO, WISCONSIN
July 27, 1983

SITE: B
SAMPLE NO.: -
DATE ENUMERATED: 9/1/83

EQUIPMENT: Ponar (1)
DEPTH: 9.3'
VOLUME: 3200 mls
DESCRIPTION: 65% fine sand, 20% silt
15% detritus
VEGETATION: none

ORGANISMS RECOVERED

<u>CLASSIFICATION</u>	<u>KEY*</u>	<u>NUMBERS</u>		<u>VOLUME (ml)</u>	
		<u>ACTUAL</u>	<u>PER SQ. METER</u>	<u>ACTUAL</u>	<u>PER LITER</u>
Oligochaetae					
<u>Lumbriculus variegatus</u>	1	135	2579	1.3	0.41
Megaloptera					
(too damaged for further).)	1	1	19	<0.1	--
Gastropoda					
<u>Lymnaea sp</u>	1	8	153	3.3	1.03
<u>Viviparus sp</u>	1	1	19	0.5	0.16
Diptera					
<u>Chironimus sp</u>	1,3	6	115	0.1	0.03
Trichoptera house	1	1	19	--	--
Amphipoda					
Haustoriidae					
<u>Pontoporreia hoyi</u>	1	1	19	<0.1	--
Pelecypoda	1	1	19	<0.1	--
8 taxa	TOTALS:	154	2941	5.3	1.63

*see listing in Appendix

TABLE 7

BENTHOS ANALYSIS
SUAMICO, WISCONSIN
July 27, 1983

SITE: C
SAMPLE NO.: -
DATE ENUMERATED: 9/6/83

EQUIPMENT: Ponar (1)
DEPTH: 8.75'
VOLUME: 3200 mls
DESCRIPTION: 65% fine sand, 20% silt
15% detritus
VEGETATION:

ORGANISMS RECOVERED					
CLASSIFICATION	KEY*	NUMBERS		VOLUME (ml)	
		ACTUAL	PER SQ. METER	ACTUAL	PER LITER
Oligochaetae					
<u>Lumbriculus variegatus</u>	1	312	5959	3.4	1.06
Pelecypoda					
Unionidae		2	38	550	172
Gastropoda					
<u>Physa sp</u>	1	2	38	0.3	0.09
<u>Pleurocera sp</u>	1	4	76	1.4	0.44
Amphipoda					
<u>Pontoporeia hoyi</u>	1	9	172	<0.1	--
Coleoptera					
<u>Copelatus sp</u>	1,2	2	38	<0.1	--
Hydracarina					
<u>Hydrachna sp</u>	1	3 adults 5 immature }	153	<0.1 <0.1	-- --
Diptera					
<u>Pentaneura sp</u>	1	4	76	<0.1	--
<u>Psychoda sp</u>	1	1	19	<0.1	--
Copepod					
<u>Cyclops sp</u>	1,2	1	19	<0.1	--
10 taxa	TOTALS:	345	6589	>555.1	>173.6

*see listing in Appendix

TABLE 8
BENTHOS ANALYSIS
SUAMICO, WISCONSIN
July 27, 1983

SITE: D
SAMPLE NO.: -
DATE ENUMERATED: 9/7/83

EQUIPMENT: Ponar (1)
DEPTH: 9.4'
VOLUME: 5500 mls
DESCRIPTION: 90% loose silt w/detritus
10% very fine sand
VEGETATION: none

CLASSIFICATION	KEY*	ORGANISMS RECOVERED		VOLUME (ml)	
		NUMBERS			
		ACTUAL	PER SQ. METER	ACTUAL	PER LITER
Oligochaetae					
Naididae					
<u>Dero sp</u>	1	5	96	<0.1	--
Aeolosomatidae					
<u>Lumbriculus variegatus</u>	1	47	898	0.2	0.04
Aptera					
<u>Chironomus sp</u>	1,3	3	57	0.2	0.04
<u>Psychoda sp</u>	1,3	2	38	<0.1	--
Hydracarina					
<u>Hydrachna sp</u>	1	2	38	<0.1	--
5 taxa	TOTALS:	59	1127	>0.4	>0.08

*see listing in Appendix

TABLE 9

DETROIT CORPS OF ENGINEERS

Harbor Big Suamico Sample Type Sediment Date Collected 7/27/83

Parameter	Site				WDR (*)	
	A	B	C	D	Interim Criteria	Exceeds Criteria
% Solids	75.8	64.8	62.8	52.2		
Total Volatile Solids (%)	0.51	2.16	2.91	5.26		
Suspended Solids						
Dissolved Solids						
TOC	1000	11,700	14,900	31,300		
BOD						
COD	3190	26,900	41,900	77,700		
Oil & Grease	507	1300	675	4630	<1000	*
Cyanide	<0.1	<0.1	<0.1	<0.1		
Phenols	<0.08	<0.08	<0.08	<0.08		
Total Phosphorous	12	122	169	513		
Dissolved Phosphorous						
TKN	102	1070	1410	2130		
Ammonia	7.9	69.6	62.7	110		
Arsenic	2.49	4.04	5.05	5.36	<10	
Iron	2260	3800	4450	7410		
Cadmium	1.6	1.8	3.2	<2	≤1.0	*
Copper	3.2	4.2	5.9	14.8	≤100	
Chromium	<5	7.1	9.7	11.1	≤100	
Nickel	<5	<6	8.6	15.1	≤100	
Manganese	54.1	104	119	181		
Lead	2.27	4.31	5.02	7.72	≤50	
Mercury	<0.1	<0.1	<0.1	<0.1	≤0.1	
Zinc	9.6	17.0	18.9	35.8	≤100	
Total PCB's	<0.01	<0.1	<0.1	<0.01	<0.05	*
Chlorinated Pesticides						
Lindane	<0.01	<0.01	<0.01	<0.01	<0.05	*
Heptachlor	<0.01*	<0.01	<0.01	<0.01	<0.05	
Aldrin	<0.01	<0.01	<0.01	<0.01	<0.01	
Dieldrin	<0.01	<0.01	<0.01	<0.01	<0.01	
Heptachlor epoxide	<0.01	<0.01	<0.01	<0.01*	<0.05	
Methoxychlor	<0.01	<0.1	<0.1	<0.01		
DDT	<0.01	<0.02	<0.02	<0.01	<0.01	
DDE	<0.01	<0.01	<0.01	<0.01		
Fecal Coliform (#/gram)	<3	9	39	21		
Density (g/ml)	1.86	1.69	1.60	1.38		
Grain Size (%)						
>0.42 mm	4	2	<1	5		
0.42-0.25 mm	6	3	2	11		
0.25-0.15 mm	58	41	16	23		
0.15-0.07mm	19	52	60	36		
<0.07 mm	13	2	22	24		

Values are ug/g dry weight except as noted.

*Present but <0.01 ug/g.

TABLE 10

BIG SUAMICO - SEDIMENTS
DUPLICATES / 1745-18200

<u>Parameter</u>	<u>Site</u>	<u>Sample Value</u>	<u>Duplicate Value</u>
Total Solids (%)	C	62.8	61.8
Total Volatile Solids (%)	C	2.91	2.92
Total Phosphorous	--	467	450
Cyanide	--	<0.1	<0.1
Ammonia	--	63.3	61.6
Mercury	C	<0.1	<0.1
TOC	--	55,600	54,800
TKN	--	1010	1380
COD	--	20,500	22,100
Arsenic	--	7.16	9.17
Iron	--	10,600	16,200
Cadmium	--	9.6	8.0
Copper	--	29.9	31.2
Chromium	--	27.2	21.0
Nickel	--	17.9	26.2
Manganese	--	392	377
Lead	--	40.2	31.6
Zinc	--	92.9	93.5

Values are µg/g.

Where no site is identified the duplicate was run on a sample from another project.

TABLE 11
DETROIT CORPS OF ENGINEERS

Harbor Big Suamico Sample Type Elutriates Date Collected 7/27/83

Parameter	Site						
	A	B	C	D			
% Solids							
Total Volatile Solids							
Suspended Solids	62	76	90	77			
Dissolved Solids	176	216	238	256			
TOC	12	16	16	36			
BOD							
COD	68	59	85	31			
Oil & Grease	14	8	<5	<5			
Cyanide	<0.005	<0.005	<0.005	<0.005			
Phenols	0.007	0.007	0.007	0.009			
Total Phosphorous	0.10	0.18	0.21	0.16			
Dissolved Phosphorous							
TKN	<5	<5	7.0	<5			
Ammonia	0.86	4.27	5.43	6.59			
Arsenic	0.003	<0.002	<0.002	0.004			
Iron	2.49	2.78	2.75	3.81			
Cadmium	0.004	0.002	0.001	0.001			
Copper	0.006	0.004	0.006	0.004			
Chromium	0.002	0.006	0.006	<0.002			
Nickel	0.004	0.004	0.006	0.007			
Manganese	0.043	0.415	0.481	0.802			
Lead	<0.002	0.007	0.008	<0.002			
Mercury	0.0003	0.0003	0.0003	0.0002			
Zinc	0.032	0.021	0.043	0.035			
Total PCB's	<0.0001	<0.0001	<0.0001	<0.0001			
Chlorinated Pesticides	<0.0001	<0.0001	<0.0001	<0.0001			
Lindane							
Heptachlor							
Aldrin							
Dieldrin							
Heptachlor epoxide							
Methoxychlor							
DDT							
DDE							
Fecal Coliform #/100 ml	<10	<10	730	400			
Density							
Grain Size							
>2 mm							
0.43-2 mm							
0.17-0.43 mm							
0.074-0.17 mm							
<0.074 mm							

Values are mg/l except as noted.

TABLE 12
BIG SUAMICO
ELUTRIATES DUPLICATES
1745-18200

<u>Parameter</u>	<u>Site</u>	<u>Sample Value</u>	<u>Duplicate Value</u>
Arsenic	A	0.003	<0.002
Iron	A	2.49	2.66
Cadmium	A	0.004	0.004
Copper	A	0.006	0.007
Chromium	A	0.002	0.006
Nickel	A	0.004	0.004
Manganese	A	0.043	0.064
Lead	A	<0.002	<0.002
Mercury	A	0.33	0.33
Zinc	A	0.032	0.035
Suspended Solids	--	40	50
Cyanide	--	<0.005	<0.005
Total Phosphate	--	0.02	0.03
Total Dissolved Solids	--	20	22
PCB's	A	<0.0001	<0.0001
Pesticides	A	<0.0001	<0.0001

Values are mg/l.

Where no site is listed, the duplicate is from another project.

TABLE 13
DETROIT CORPS OF ENGINEERS

Harbor Big Suamico Sample Type Water Date Collected 7/27/83

Parameter	Site					
	A	B				
% Solids						
Total Volatile Solids						
Suspended Solids	6	10				
Dissolved Solids	200	178				
TOC	12	12				
BOD						
COD	<20	<20				
Oil & Grease	<5	<5				
Cyanide	<0.005	<0.005				
Phenols	0.008	0.009				
Total Phosphorous	0.09	0.07				
Dissolved Phosphorous						
TKN	<1	<1				
Ammonia	<0.05	0.06				
Arsenic	<0.002	<0.002				
Iron	0.155	0.138				
Cadmium	<0.001	<0.001				
Copper	0.002	0.002				
Chromium	<0.002	<0.002				
Nickel	<0.002	0.016				
Manganese	0.029	0.038				
Lead	<0.002	0.002				
Mercury	<0.0002	<0.0002				
Zinc	0.028	0.018				
Total PCB's	<0.0001	<0.0001				
Chlorinated Pesticides						
Lindane	<0.0001	<0.0001				
Heptachlor	<0.0001	<0.0001				
Aldrin	<0.0001	<0.0001				
Dieldrin	<0.0001	<0.0001				
Heptachlor epoxide	<0.0001	<0.0001				
Methoxychlor	<0.0001	<0.0001				
DDT	<0.0001	<0.0001				
DDE	<0.0001	<0.0001				
Fecal Coliform (#/100 ml)	<10	<10				
Density						
Grain Size						
>2 mm						
0.43-2 mm						
0.17-0.43 mm						
0.074-0.17 mm						
<0.074 mm						

Values are mg/l except as noted.

Guidance Criteria for In-Water Disposal

Based upon current knowledge regarding in-water disposal of dredge materials, the WDNR is considering the possibility of allowing in-water disposal of clean dredged material. A WDNR technical subcommittee has developed guidelines for evaluating the in-water disposal option for dredged material. These guidelines are as follows:

- . If any pollutant, or group of pollutants, of concern is found in concentrations greater than 125% of the interim criteria for that pollutant, in-water disposal will not be allowed.
- . If three or more pollutants are found in concentrations greater than 110% of the interim criteria for those pollutants, in-water disposal will not be allowed.
- . If one or two pollutants are found in concentrations within the range of 110-125% of the interim criteria for those same pollutants, in-water disposal will be determined on a case-by-case basis.
- . If all pollutants are found at concentrations of 110% or less than the interim criteria for those same pollutants, in-water disposal may be allowed.
- . For on the beach disposal, the particle size of the dredged material must meet the following criteria: the average percent of spoil material finer than .074 mm must be within 10-15 percent points of average disposal site material finer than .074 mm. For in-water disposal, particle size matching is not required.
- . For near shore disposal, 50 percent or more of sand is required by WDNR (as per proposed revisions to NR 347).

SECTION 4

**PROPOSED DREDGE MATERIAL
DISPOSAL SITING**

Methodology

In order to develop a map of potentially feasible dredge disposal sites in the Town of Suamico, it is necessary to accumulate as much of the appropriate information pertaining to the physical nature of the Town as is possible.

Unless a potential dredge disposal site is physically investigated through the use of detailed soil borings, it is impossible to be assured of its acceptability. For that reason, this plan will identify specific reuse options but only identify potential dredge disposal locations. If this plan would be carried on to the implementation phase, more detailed review and analysis would be required to determine the suitability of specific sites.

It must be noted that in all probability, not all of the potential dredge disposal sites have been identified in a plan of this scope. By the very nature of the base data, portions of the Town identified as having moderate probability for a site might in fact have several most probable locations.

Physical Limitation Affecting Dredge Disposal Siting

For various reasons, there are a number of physical features such as wetlands, floodplains, soils and critical habitat areas that may limit the placement of dredge disposal sites. These factors are especially true when dealing with contaminated dredge material. A summary of these conditions include:

- . Within 1,000 feet of any navigable lake, pond or flowage,
- . Within 300 feet of any navigable river or stream,
- . Within an area that has been identified as floodplain by WDNR and the Federal Emergency Management Agency (FEMA),
- . Within wetlands that are delineated on the Brown County Wetland maps,
- . Within critical habitat areas that have been delineated,
- . Within areas where there is reasonable probability that the disposal of dredge material will have a detrimental effect on surface water and/or groundwater, and
- . Within areas where the prominent soil types are not conducive to support a dredge disposal site or solid waste land fill site.

General Dredge Disposal Options

Once all of the necessary permits and approvals have been obtained for the dredging of a particular area, disposing of the dredge material in a safe and efficient way is of primary concern. The following is a compilation of disposal options:

1. When dredged material is polluted according to EPA criteria, two disposal methods exist:
 - . Polluted dredged material that doesn't contain toxic and/or hazardous contaminants can be disposed of in a CDF or other licensed facility.
 - . Polluted dredged materials containing high levels of PCB's, heavy metals or other toxic materials may require special care in disposal, such as placing them in a specially-designed and licensed toxic and hazardous waste disposal site.
2. When dredged material is unpolluted by EPA standards, many options exist under existing laws for the disposal of the disposal of the material, including many beneficial uses:
 - . Permanent upland disposal site - Filling abandoned gravel pit or creating a diked disposal area are examples of permanent upland disposal. This option requires a solid waste license or waiver under Chapter 180, Wis. Adm. Code. Upland disposal sites might require a pollutant discharge permit under Chapter 200, Wis. Adm. Code, if the site has a discharge to a waterway or to the groundwater.
 - . Transfer/reuse site - A permanent site for storage of reusable materials requires a solid waste license (or waiver of license). If the site is located on the bed of a waterway, a structure permit (s. 30.12, Stats.) would be required.
 - . Shore protection - Using dredged material in riprap or other shore protection projects does not require a permit if the dredged material is placed above the ordinary high-water mark (OHWM), behind an approved bulkhead line, or is used to replace shoreline material which has eroded in the past year.
 - . Fill behind bulkhead lines - Dredged material may be used as fill behind an approved bulkhead line. A pollutant discharge permit or solid waste license may be required.
 - . Marsh restoration/creation - Instead of creating dry land, fill may be used to create or restore wetland

conditions. Restoration might be possible without permits or authority if the purpose of the filling is to reclaim suddenly lost shoreland. In this case, filling must be done within one year after the damaging erosion event. Marsh creation might be possible by combining a submerged lands lease and a bulkhead line.

- . Littoral drift continuation - Breakwaters and similar structures interrupt the natural long shore transport of sediment by currents (littoral drift) - causing sediments to accumulate and increasing down drift erosion. If the dredged materials are clean, depositing them down drift from the artificial barrier would preserve an important natural process. Littoral drift continuation might be possible by combining a submerged land lease and a bulkhead line.

- . Beach nourishment - Clean dredge materials may be used to nourish an existing beach as a shore protection methods. This use requires no permit if the dredged material is placed above the ordinary highwater mark or behind an approved bulkhead line. Beach nourishment is commonly used to offset damage caused by coastal structures that interfere with littoral drift.

3. Other options for the disposal of dredged materials that might be permitted include:

- . Construction of breakwaters, jetties, groins, etc.
- . Construction of marinas and harbor facilities.
- . Construction of bridges and/or causeways.
- . Construction of bridges and/or causeways.
- . Construction of parks, roads, sewage treatment facilities, etc.
- . Surface application on agricultural land as a soil conditioner.
- . Capping for landfill.
- . Economically used for highway ice control.
- . In-water, near-shore disposal of clean dredged material may be an option if NR 347 is revised to permit such activity.

Recommended Dredge Disposal Alternatives - Town of Suamico

Based on the test data that was compiled back in 1983 from the reuse options identified previously and from discussions with WDNR Personnel, the future disposal of dredge material from the Suamico Harbor should be limited to upland disposal sites. Specific reasons for this recommendation include:

1. The current language contained within Chapter 30.12 of the Wisconsin State Statutes states that in water disposal of dredge material is not permitted;
2. WDNR staff have reevaluated the sampling data that was prepared in 1983 by the Corps of Engineers and have determined that the presence of Oils, Grease, Cadmium, PCB's and DDT make the dredge materials from the harbor area unsuitable for in-water disposal.

Reuse and Disposal Options

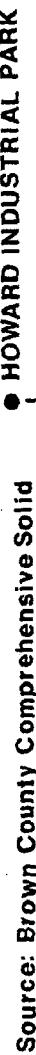
Several specific reuse options and upland disposal sites have been identified for the dredge material from the Suamico Harbor.

1. (a) Beach nourishment would be suitable during periods with normal water levels. But at the current time, the high water has consumed many of the original shoreland areas and has resulted in many of the beaches being under several feet of water. Also, the quality of the dredge material for beach nourishment is questioned because of sediment conditions. When water levels subside and the sediment conditions are more accurately known, the potential reuse of clean dredge material for beach nourishment should be reevaluated. (b) Allowing property owners to fill behind bulkhead lines is also possible. The problem with this option is that many of the landowners in the Suamico area need little or no fill. (c) Wetland restoration is another possible reuse option. With current water levels, several wetlands in the area can be restored to their once natural state. (d) Restoration/protection of Long Tail Point is another option. Much of this effort would involve the placement of clean material on Long Tail Point to protect it from the record high Bay levels. (e) A final reuse option is the placement of dredge material around the lighthouse. This would provide protection for the facility from the immediate effects of high water. It must be noted that some type of containment would be needed to keep the dredge material in place.
2. Several upland areas exist in the vicinity of the Suamico harbor that appear to have suitable soil conditions to accommodate dredge material disposal. Also, these areas have been evaluated as to their relationship to nearby

development and land uses (see Map 10). These upland areas include raising the elevations of developed areas that are along the river and bay shoreline, and in the nearby Howard Industrial Park. Some of the developed areas adjacent to the Suamico harbor are very low and are in need of fill. A significant problem does exist in that many of these areas are now under several feet of water and current WDNR regulations do not permit the in-water placement of fill material. When water levels do subside, these areas should be reevaluated as upland disposal sites for clean dredge material.

A second upland disposal site for clean dredge material is the Howard Industrial Park which is located approximately four and one half miles to the southwest. Some of the industrial park is located in a 500 year floodplain. Fill could be placed in the park which would permit better utilization of some of the park sites while not inhibiting the water retention capabilities of the floodplain area. In addition to these areas, there are a number of low areas in the Suamico area that could be filled. But, the use of dredge material for fill purposes should not occur at this time until new test data can determine the overall effect of the before-mentioned contaminants in the dredge material.

41



Summary - Future Considerations

Based on the data that has been assembled, several factors need further consideration. These include: deficiencies in the sediment testing data, costs, potential funding sources and community involvement activities.

Deficiencies in Sediment Testing Data

The sediment data listed earlier for the Suamico harbor is deficient in several ways. First, the location of the test sites are not completely correct. Site C is located in close proximity to the outfall pipe of the sewage treatment plant. The sediment tests may, therefore, be skewed.

Also, the areas that need dredging most are found in the vicinity to sites B, C and D. Some dredging may also be required in the upstream area of the river but no current sediment test data is available. Based on these deficiencies, additional sediment test data must be obtained to better indicate the location and physical makeup of the dredge material.

Costs

Sediment Testing: Before dredging of material can actually occur in the Suamico Harbor, better sediment data must be obtained. It has been estimated by the U.S. Army Corps of Engineers that new sediment sampling and testing would cost between \$7,500-10,000.

Dredging: Based on the amount of material needed to be dredged from the Suamico Harbor is approximately 30,000 cubic yards and an estimated dredging cost of \$5.00/cubic yard, approximately \$150,000 would be needed based on current dollar estimates to dredge all of the existing material from the Suamico Harbor and move the material to one or more upland areas.

Potential Funding Sources

A number of potential funding sources exist that may be applicable for the funding of sediment testing and dredging in the Suamico Harbor. These possible funding sources include the U.S. Army Corps of Engineers, Wisconsin Waterways Commission, Harbor Assistance Program and Wisconsin Coastal Management Program. In addition to these outside sources, the Town of Suamico could be viewed as potential funding source for future dredging and dredge related activities.

Community Involvement

BLRPC staff prepared this harbor management plan for the Suamico Harbor in anticipation to changes to legislation that relates to final placement of clean dredge material. This plan was developed with the technical assistance of Wisconsin Department of Natural Resources and Wisconsin Coastal Management personnel. The direct impact of local officials and residents from the Suamico Harbor area was not pursued.

The primary reason for not pursuing local involvement centered around the fact that the legislation needed to support in-water disposal of clean dredge material did not legally exist. Commission and WDNR staff felt that leading communities to believe that in-water disposal was permitted before the laws were changed would do more harm than good. A second factor which contributed to this decision included the fact that the sediment data for the Suamico harbor was inadequate to make an accurate determination if the proposed dredge material is clean or not. A third factor is that current high water conditions found on the Great Lakes do not make dredging a priority issue especially in small communities such as Suamico. Also, there are very limited dollars available to pay for dredging in communities of this size. In many instances, the only dollars now available for dredging are local. With greater competition for state and federal funds that are available to local units of government, greater demands are being placed on local revenues funds for day-to-day administrative uses.

The specific reuse options and potential disposal sites that have been developed for this plan should be used as a guide for future dredge disposal planning efforts. Once the legislation has been approved by the Wisconsin Legislature which permits as an option, in-water disposal of clean material, BLRPC and WDNR staff will work with the local unit of government (Town of Suamico) to refine the findings of this document. Only then can specific proposals relating to the siting of dredge material be acted upon.

APPENDICES

APPENDIX A
State Regulations Affecting Dredging

The Wisconsin Department of Natural Resources (herein referred to as WDNR) has the regulatory authority in Wisconsin to oversee all dredging projects that occur in Wisconsin's navigable waterways. A summary of each of these regulations has been developed and is provided in the following:

General Dredging Regulations:

Removal of material from beds of navigable waters, Section 30.20, Wisconsin State Statutes. Removal of any material from any navigable lake or stream bed requires a contract with, or permit from, the DNR. Dredging contracts/permits specify methods of disposal which help minimize or eliminate adverse effects of dredging on water quality, habitat, and recreation.

Regulations of dredging projects on the beds of waterways, NR 347, Wisconsin Administrative Code. This rule provides legal definitions of dredging related terms, lists required projects and environmental information, and specifies the implementation (as it applies to dredging of the wastewater treatment facility plan approval program, the solid and hazardous waste management programs and the Wisconsin Pollution Discharge Elimination System.

Water Quality-Related Laws:

Wastewater treatment facility plan approval, Section 144.04, Wisconsin Statutes. Under this program, all wastewater treatment facilities and sewer extensions constructed for the handling of dredged material disposal must have approved plans prior to beginning construction. Changes to such facilities must also be approved. All treatment facility plans must conform with existing approved areawide waste treatment management plans under the federal Clean Water Act. A dredged material disposal facility may require plan approval since it can involve treatment of waterborne pollutants.

Solid and hazardous waste management programs, Sections 144.43 through 144.784, Wisconsin State Statutes. This group of laws directed the DNR to develop standards for permitting and licensing the construction and operation of solid and hazardous waste disposal facilities. From a preliminary discussion of a proposed dredging project, the DNR determines what technical information is required for permitting. This is based on the amount of dredged material and the potential for contamination of the sediments with PCB's or other hazardous substances. The laws provide for county-level solid waste management planning to be coordinated with recycling and other regional plans. Depending on the nature of the dredged

material and the disposal site, a solid or hazardous waste license may be required.

Wisconsin Pollution Discharge Elimination System, Chapter 147, Wisconsin State Statutes. To eliminate the harmful effects of pollutants on waters and the organisms that depend on them, the legislature directed the DNR to establish limits on effluent discharges. No one may discharge a pollutant to a waterway without a permit. DNR review of the dredging discharge permit application may determine that the project can be authorized by a "general permit" which establishes basic effluent limitation that must be met. For dredging projects not receiving the general permit, a permit is processed and individual effluent limitations are established.

Water quality certification program, NR 299 Wisconsin Administrative Code. The federal Clean Water Act of 1977 requires projects receiving federal approval in state waters to meet state water quality laws. The administrative rule establishes the standards and procedures for determining whether federally issued permits meet the requirements of state laws.

Obstruction-Related Laws:

Establishment of bulkhead lines, Section 30.11, Wisconsin State Statutes. This statute enables a municipality to pass an ordinance subject to DNR approval establishing an artificial line (bulkhead line) delineating the shore of any navigable water within its boundaries. Waterfront property owners may place solid structures or fill up to such lines if they meet standards for the protection of fish, wildlife and water quality. A bulkhead line must meet two legal requirements: its purpose must be in the public interest and it must follow the existing shoreline as nearly as practicable. In the Great Lakes and other waterways where the Corps of Engineers maintains commercial navigation projects, a submerged lands lease may be combined with a bulkhead line to allow structures or fill to be placed farther from the shoreline than by bulkhead line alone.

Structures and deposits in navigable waters, Section 30.12, Wisconsin State Statutes. This statute prohibits the deposit of any material or the placement of any structure on the bed of any navigable water or beyond a lawfully established bulkhead line without a permit. Structures such as groins and jetties, sand blankets, fish cribs or riprap may be placed in navigable waters by permit. Deposits of materials that have no intended use or form are prohibited.

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